UNIVERSITI SAINS MALAYSIA

Second Semester Examination
2009/2010 Academic Session

April/May 2010

RPG 131 – Applied Quantitative Methods
[Kaedah Kuantitatif Gunaan]

Duration: 3 hours
[Masa: 3 jam]

Please check that this examination paper consists of NINE pages of printed material before you begin the examination.

Sila pastikan bahawa kertas peperiksaan ini mengandungi SEMBILAN muka surat yang tercetak sebelum anda memulakan peperiksaan ini.

Students are allowed to answer all questions either in English OR in Bahasa Malaysia only.

Pelajar dibenarkan menjawab semua soalan dalam Bahasa Inggeris ATAU Bahasa Malaysia sahaja.

Answer **FIVE** questions only. **Section A** is **COMPULSORY** and answer **TWO** questions from **Section B.**

*Jawab **LIMA** soalan sahaja. **Bahagian A** adalah **WAJIB** dan jawab **DUA** soalan dari **Bahagian B.***

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunapakai].

…2/-

SECTION A: COMPULSORY
BAHAGIAN A: WAJIB

1. (a) Calculate the mean of 46, 53, 66, 71 and 89 if they were weighted 4, 3, 5, 2 and 7, respectively.

Kira min bagi 46, 53, 66, 71 dan 89 sekiranya masing-masing mempunyai pemberat 4, 3, 5, 2 dan 7.

(2 marks/*markah)*

(b) One bag contains 6 red balls and 4 blue balls; another contains 5 red balls and 8 blue balls. If one ball is drawn from each bag, what is the probability that:-

(i) both balls are red?
(ii) one is red and one is blue?
(iii) both balls are blue?

Sebuah beg mengandungi 6 biji bola merah dan 4 biji bola biru; sebuah beg lagi mengandungi 5 biji bola merah dan 8 biji bola biru. Jika sebiji bola diambil daripada setiap beg, apakah kebarangkalian mendapat:-

(i) 2 biji bola merah?
(ii) sebiji bola merah dan sebiji bola biru?
(iii) 2 biji bola biru?

(2 marks/*markah)*

(c) The mean age of all shoppers at a local store is 37 years old with standard deviation of 7 years. The store launched a new advertisement campaign in an attempt to attract older shoppers. Following the advertising, a random sample of 47 shoppers showed a mean age of 39.3. Is there sufficient evidence to suggest that the advertisement campaign is successful in attracting older shoppers? Assume a normal distribution and test your hypothesis at 0.05 significance level.

Min umur pelanggan sebuah kedai ialah 37 tahun dengan sisihan piawai 7 tahun. Kedai itu melancarkan kempen pengiklanan baharu dengan tujuan menarik pelanggan yang lebih tua. Ekoran kempen tersebut, sampel rawak melibatkan 47 orang pelanggan mendapati min umur adalah 39.3. Adakah terdapat bukti yang cukup bahawa kempen pengiklanan telah berjaya menarik pelanggan yang lebih tua? Andaikan taburan normal dan uji hipotesis anda pada tahap signifikan 0.05.

(5 marks/*markah*)

(d) Explain the **Four (4)** variations in time series analysis. Provide an example for each variation.

*Terangkan **Empat (4)** variasi dalam analisis siri masa. Berikan satu contoh bagi setiap satu variasi.*

(7 marks/m*arkah)*

(e) A conditional profit table for sales of oranges (in boxes) is shown in **Table 1**. Using the expected value criterion, calculate the number of boxes the seller should stock to maximize profits.

*Jadual 'conditional profit' bagi jualan buah oren (mengikut bilangan kotak) ditunjukkan dalam **Jadual 1**. Dengan menggunakan kriteria expected value, kira bilangan kotak yang perlu distok oleh penjual untuk mendapat keuntungan yang maksima.*

Table 1/*Jadual 1*

Possible demand (sales) in boxes/ *Kemungkinan permintaan (jualan) mengikut bilangan kotak*	Possible Stock Action/ *Kemungkinan Pengambilan Stok*			
	10 boxes/ *kotak* (RM)	11 boxes/ *kotak* (RM)	12 boxes/ *kotak* (RM)	13 boxes/ *kotak* (RM)
10	500	480	460	440
11	500	530	510	490
12	500	530	560	440
13	500	530	560	590
Number of boxes/ *Bilangan kotak*	10	11	12	13
Probability/*Kebarangkalian*	0.25	0.15	0.20	0.40

(4 marks/*markah*)

2. (a) Explain the difference between dependent variable and independent variable.

Terangkan perbezaan antara pembolehubah bersandar dengan pembolehubah tidak bersandar.

(5 marks/*markah*)

(b) Describe the meaning of the following terms and give an example:-

Berikan maksud istilah-istilah berikut dan berikan contohnya:-

(i) Population/*Populasi*

(ii) Population Frame/*Kerangka Populasi*

(iii) Element/*Elemen*

(iv) Subject/*Subjek*

(v) Sample/*Sampel*

(vi) Sampling/*Persampelan*

(15 marks/*markah*)

3. Think of one research topic of your interest and discuss the advantages and the disadvantages according to the:-

Fikirkan satu topik penyelidikan yang anda minati dan bincangkan kebaikan dan keburukan mengikut:-

(a) Methodology/*Metodologi*

(b) Sampling Method/*Kaedah Sampling*

(c) Analysis/*Analisis*

(20 marks/*markah*)

SECTION B: Answer **TWO** questions only.
BAHAGIAN B: *Jawab **DUA** soalan sahaja.*

4. (a) Draw a normal distribution and explain the characteristics of a normal distribution.

Lukis sebuah taburan normal dan terangkan ciri-ciri sebuah taburan normal.

(3 marks/*markah*)

(b) A number from 1 to 13 is chosen at random. What is the probability of:-

(i) choosing an odd number?

(ii) choosing number 5 or less?

Satu nombor antara 1 hingga 13 dipilih secara rawak. Apakah kebarangkalian:-

(i) satu nombor ganjil dipilih?

(ii) nombor 5 atau kurang dipilih?

(2 marks/ markah)

(c) Explain the null hypothesis and the alternative hypothesis using your own examples.

Terangkan hipotesis null dan hipotesis alternatif dengan memberikan beberapa contoh sendiri.

(3 marks/*markah)*

(d) In a clinical exam, a sample of 1,000 persons screened for a certain disease is distributed according to height and disease status as shown in **Table 2**.

From **Table 2,** what is the probability of:-

(i) being short or medium in height and having severe disease status?

(ii) being tall in height and having moderate or severe disease status?

Dalam satu pemeriksaan klinikal, sampel seramai 1,000 orang dikenalpasti ukuran ketinggian dan status penyakit masing-masing seperti ditunjukkan dalam ***Jadual 2****.*

Daripada ***Jadual 2****, apakah kebarangkalian mendapat:-*

(i) seorang yang rendah atau sederhana tinggi dan mempunyai status penyakit yang teruk?

(ii) seorang yang tinggi dan mempunyai status penyakit yang sederhana atau teruk?

(2 marks/ *markah*)

Table 2 /*Jadual 2*

Height/ *Ketinggian*	Disease Status /*Status Penyakit*				
	None/ *Tiada*	Mild/ *Kurang*	Moderate/ *Sederhana*	Severe/ *Teruk*	Total/ *Jumlah*
Tall /*Tinggi*	124	82	143	62	411
Medium/*Sederhana*	70	49	88	37	244
Short /*Rendah*	106	69	119	51	345
Total /*Jumlah*	300	200	350	150	1,000

(e) Based on data on tourist arrival at a resort in **Table 3**, calculate a 4-quarter centered moving average. Explain the results of your calculations.

Berdasarkan data ketibaan pelancong di sebuah resort dalam ***Jadual 3****, kira '4-quarter centered moving average'. Terangkan hasil kiraan anda.*

(5 marks/*markah)*

Table 3/*Jadual 3*

Year/ *Tahun*	Spring/ *Musim Bunga*	Summer/ *Musim Panas*	Fall/ *Musim Luruh*	Winter/ *Musim Sejuk*
2004	77	95	76	112
2005	75	98	73	114
2006	74	94	77	115
2007	78	93	78	111
2008	76	99	76	110
2009	75	98	75	113

(f) Explain what is an index number?

From **Table 4**, determine the index number for the number of new businesses established for 1995-2010, using 1990 as the base year. Explain the results of your calculation.

*Terangkan apakah nombor indeks? Dari **Jadual 4**, kira numbor indeks bagi penubuhan perniagaan baru pada 1990-2010, menggunakan1990 sebagai tahun asas.*

Table 4/*Jadual 4*

Year/ *Tahun*	Number of New Business/ *Bilangan Perniagaan Baru*	Index Number / *Nombor Indeks*
1990	10.8	100
1990	10.8	100
1995	7.9	?
2000	11.6	?
2005	14.1	?
2010	16.7	?

(5 marks/*markah)*

5. (a) How to measure the central tendency for interval variables? Explain with an example.

Bagaimana mengukur kecenderungan pusat bagi pembolehubah interval?. Terangkan dengan satu contoh.

(5 marks/*markah*)

(b) There are many problems with using mode to measure typicality. Choose only **Five (5)** problems and explain with an example.

Terdapat banyak masalah dalam menggunakan kekerapan dalam pengukuran statistik. Pilih **Lima (5)** masalah sahaja dan terangkan dengan contoh.

(15 marks/*markah*)

6. Explain the sampling method given below:-

(a) Non-probability Sampling Methods:-

(i) Convenience Sampling
(ii) Quota Sampling
(iii) Snowball Sampling

(b) Probability Sampling Methods:-

(i) Simple Random Sampling
(ii) Systematic Sampling
(iii) Stratified Sampling
(iv) Cluster Sampling
(v) Multi-Stage Sampling

Hurai kaedah sampling berikut:-

(a) Kaedah Sampling Bukan Kemungkinan:-

(iv) Sampling Mudah
(v) Sampling Kuota
(vi) Sampling Gumpalan

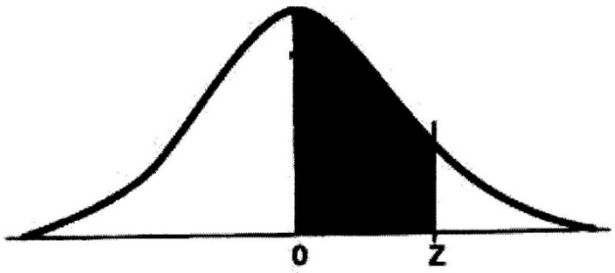
(b) Kaedah Sampling Kemungkinan:-

(vi) Simple Random Sampling
(vii) Sampling Sistematik
(viii) Sampling Stratifikasi
(ix) Sampling Kelompok
(x) Sampling Multi-Peringkat

(20 marks/*markah*)

FORMULA

$$Z = \frac{\bar{x} - \mu}{s_{\bar{x}}}$$



This table presents the area between the mean and the Z score . When Z=1.96, the shaded area is 0.4750.

Areas Under the Standard Normal Curve

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000									

Source: Adapted by permission from *Statistical Methods* by George W. Snedecor and William G. Cochran, sixth edition © 1967 by The Iowa State University Press, Ames, Iowa, p. 548.